CHAPTER SEVEN PROGRAMS FOR GROUND WATER POLLUTION CONTROL

New Mexico relies on several programs to protect and maintain ground water quality. These include programs established under the New Mexico Water Quality Act (§ 74-6-1 et seq., NMSA 1978), the major statute dealing with water quality management at the State level, as well as other programs and actions taken under other State law and regulations which have components related to ground water pollution (see Appendix E). In addition, the State cooperates with the federal government on various ground water pollution control programs derived from federal mandates. Counties and municipalities also have broad authorities relevant to ground water pollution control. Important aspects of both State and federal programs and of local authorities are described below.

NEW MEXICO WATER QUALITY ACT

Under the authority of the Water Quality Act, the New Mexico Water Quality Control Commission (WQCC) has promulgated regulations **(1)** to protect the State's ground waters, including the broadly applicable ground water protection regulations of Subpart III, the more detailed additional requirements of Subpart V for underground injection control, and the cleanup regulation found in Subparts I and IV.

Ground Water Protection Regulations

In 1977 the WQCC adopted a comprehensive set of State ground water protection regulations, Subpart III of the WQCC regulations. These regulations are designed to protect all ground waters with total dissolved solids concentrations of 10,000 mg/L or less for present and potential future use as domestic and agricultural water supply, and to protect those segments of surface waters which are gaining because of ground water inflow for uses designated in the New Mexico Water Quality Standards for Interstate and Intrastate Streams **(2)**.

Since their adoption these regulations have been a relatively effective tool in preventing ground water contamination. Prevention of ground water contamination is the most effective approach - and in many cases, the only effective approach - to protection of ground water quality. Once contaminated, ground water presents particularly difficult problems because cleanup is both difficult and expensive.

The two basic aspects of ground water protection regulations are (1) ground water quality standards, and (2) the requirement that a person discharging onto or below the surface of the ground demonstrate he will not cause these standards to be violated in ground water at any place of present or foreseeable future use, and will not cause any stream standard to be violated. The combination of these two aspects results in a detailed, enforceable discharge plan, which is in effect, a ground water discharge permit.

Ground Water Standards

As of 1996, 47 numeric ground water quality standards had been adopted. Of those, 27 were adopted in 1977 in the original regulations. Eight toxic organic compounds were added in 1982, and twelve additional toxic organic compounds were added in 1986.

When the background concentration of a substance in ground water exceeds a numeric standard, the background concentration of the parameter becomes the standard. In addition to the numeric standards, there is also a requirement that approximately 87 listed toxic pollutants not be present in concentrations in ground water which would create a lifetime risk of more than one cancer per 100,000 exposed persons at a place of present or reasonably foreseeable future use. Monitoring requirements included in discharge plans should assure that any failure of the plan will be promptly identified and corrected so that ground water will not be degraded beyond standards.

Discharge Permits

The discharge permit requirement can be described as a discharge plan prepared by the discharger which the New Mexico Environment Department (NMED) or the Energy, Minerals and Natural Resources Department's Oil Conservation Division (OCD) approves, approves with conditions or disapproves. The permits regulate a wide range of discharges which may impact ground water. These include discharges to surface impoundments and leach fields, application of wastes to land, and well injection. Among discharges specifically exempted are those related to coal surface mining which are regulated under the New Mexico Coal Surface Mining Act (§§ 69-25A-1 et seq., NMSA 1978), and specific constituents permitted under the National Pollutant Discharge Elimination System (NPDES) under the Clean Water Act (CWA). Other discharges specifically exempted include those from oil and natural gas exploration and production activities, which are regulated by the Oil Conservation Commission under the New Mexico Oil and Gas Act (§§ 70-2-1 et seq., NMSA 1978) and individual domestic septic tank discharges of less than 2,000 gallons a day, which are regulated under the State's liquid waste disposal regulations. Water used in irrigated agriculture is also exempted unless that irrigation water is effluent from a system for treating or disposing of wastes.

Discharge permits have been required since 1977 for all new or modified discharges that may affect ground water. Discharge permits are also required for any discharges existing prior to 1977 upon formal notification by NMED or OCD. Discharge plans consist of

primarily four parts, an operational plan, a monitoring plan, a contingency plan and a closure plan. Together these plans must demonstrate that ground water quality will not be impacted by the discharge.

Discharge permits usually are approved for a period of five years . Because the regulations became effective in 1977, many discharge plans have been in effect for five years or more. As a result, many recent discharge plan reviews were for renewal of existing discharge plans.

Under authority granted the WQCC in § 74-6-5. J. of the Water Quality Act, fees collected from facilities seeking a ground water discharge plan help fund NMED and OCD discharge plan programs. Fees account for approximately 10 percent of the cost of issuing, modifying and renewing permits; periodic monitoring of permitted facilities; and inspections and enforcement of permit requirements.

Under the WQCC's delegation of responsibility for administration of State ground water protection regulations, OCD reviews and approves discharge plans as they apply to oil refineries, natural gas processing plants and compressor stations, carbon dioxide facilities, geothermal installations, natural gas transmission lines, brine production wells and oil field service companies. Through December 1996, OCD was responsible for approximately 325 discharge plans.

NMED is delegated responsibility for enforcement of the State ground water protection regulations as they apply to all industrial facilities (including mining), municipal and agricultural discharges. By the end of 1997, NMED had received and processed over 1,216 discharge plans and 750 facilities were operating under discharge plans.

Facilities under Discharge Plans

Besides the usual sewage and industrial discharges, other significant areas of activity in the permitting of discharges to ground water involve dairies, food processing mineral extraction, hydrocarbon cleanups, sludge and septage disposal, and pre-1977 discharges being brought into compliance with the regulations. Permitting of discharges with significant potential for ground water contamination, but which were in existence prior to the adoption of the ground water regulations in 1977, has proved to be a time-consuming effort for NMED and OCD technical and legal staff.

Sewage

Many discharge plans reviewed by NMED are for domestic wastewater disposal systems. Systems subject to discharge plan requirements include both private domestic wastewater systems discharging over 2,000 gallons a day, such as those serving trailer parks and resort developments, and public systems such as municipal sewage disposal systems which do not discharge to "waters of the United States" (40 CFR § 122.2).

Mineral Extraction

Extraction of a variety of minerals is an important activity in New Mexico, with copper, molybdenum and uranium receiving major permitting attention in past years. At present, all former uranium mills are closed or undergoing reclamation and remediation with the exception of Quivera Mining Company which is on standby for possible ore processing in the future. The large molybdenum mining operation in Taos County which had been on standby for several years reopened in 1996. In the southwest, the Phelps Dodge Tyrone copper flotation mill has closed, however, the copper dump leaching is expanding and will continue for an undetermined period of time. Continental Mine and Mill has resumed operation and has been purchased by Chino Mine Company which has expanded its operation to include copper heap leaching. Some inactive facilities remain under discharge plans as ground water cleanup activities proceed. Mining discharge permitting is expected to be a priority for the next two years due to the effect of deadlines in the New Mexico Mining Act Regulations on the discharge permit program. Under the Mining Act, NMED must issue a determination that all environmental standards will be met upon closure of the facility. NMED is therefore modifying all mining permits to incorporate closure plans which will protect ground water quality upon closure.

Dairies

In the southeastern part of the State, number of dairies continues to rapidly the increase. As of the end of 1997, there are approximately 149 dairies with approved discharge plans statewide. During 1997 and 1998, 21 unpermitted dairies were called in for permits. Ground water contamination has been identified to date at 37% of permitted dairies and is limited to nitrate, chloride and\or TDS concentrations exceeding the WQCC's regulatory criteria.

Hydrocarbons

Discharge permit applications for the disposal of wastes containing hydrocarbons continue to be submitted. This contamination can be caused by leaking underground storage tanks, spills, or effluents from car wash, service stations or machinery steam cleaning facilities. Cleanup may include treatment of contaminated ground water and treatment and disposal of contaminated soils. A discharge permit is required for any cleanup or other activity involving a discharge of effluent or leachate which may impact ground water. Some discharge permits involve withdrawing contaminated ground water from the aquifer, treating it, and disposing of the treated effluent by means of infiltration beds or reinjection into the subsurface. Treated effluent cannot be discharged to a surface watercourse without obtaining an NPDES permit. Discharge permits have also been issued for land farming of a variety of petroleum contaminated soils.

Sludge and Septage

Two other related types of activity that have continued this biennium are the disposal of sewage treatment plant sludges and disposal of septage, the

materials periodically pumped from septic tanks. Land application or disposal of sewage treatment plant sludges and septage have been required for over a decade to be done in conformance with a discharge permit for the protection of ground water. NMED is in the process of developing septage tracking regulations which will help to minimize illegal dumping of septage in unpermitted areas.

Underground Injection Control

The State of New Mexico has primacy (that is, primary enforcement authority) over the underground injection control program established by the federal Safe Drinking Water Act (SDWA). Primacy was obtained in 1982 for injection wells used in drilling for and production of oil and natural gas, known as Class II wells in the United States Environmental Protection Agency's (EPA's) classification system, and for all other classes of wells in 1983. Primacy makes a state eligible for an annual federal grant under the SDWA. In New Mexico, primacy also avoids the necessity of having EPA run a federal underground injection control program in the State in duplication of the long-established State program.

New Mexico's underground injection control program is carried out partly under the authority of the New Mexico Oil and Gas Act and partly under the authority of WQCC regulations promulgated pursuant to the New Mexico Water Quality Act. OCD is the lead State agency for the under ground injection control program because the majority of injection wells in the State are associated with oil and natural gas production. Regulation of these wells is described below under Oil and Gas Act.

The WQCC regulations apply to underground injection wells other than those associated with oil and natural gas production. NMED administers this program except for OCD-administered brine production wells and those wells disposing of effluent from refineries, geothermal operations and the oil field service industry. All types of injection wells subject to WQCC regulations must comply with general ground water protection provisions of Subpart III. Injection wells used for effluent disposal and *in situ* mineral extraction must also meet the technical requirements imposed by Subpart V of the WQCC regulations, which were adopted in 1982.

Mineral extraction wells (Class III wells) regulated under the underground injection control regulations have thus far been limited to *in situ* uranium mining, brine production, and copper leaching. In 1991, NMED approved one *in situ* uranium mine discharge plan within the Crownpoint area which has yet to initiate operations.

Besides mineral extraction wells, underground injection wells under the jurisdiction of the WQCC include effluent disposal wells injecting wastes below underground sources of drinking water (Class I) and an assortment of other wells (Class V). Wells injecting hazardous or radioactive waste into or above a drinking water supply source (Class IV wells) are now prohibited.

NMED completed an inventory for EPA of Class IV and V injection wells located within 1,000 feet of municipal wells serving the City of Española. The report was presented at the annual Ground Water Protection Council/EPA Underground Injection Control Conference in November, 1993 at Boston, Massachusetts. Also, NMED completed in 1995 a survey of owners of automobile service facilities to determine the presence of Class IV and V injection wells associated with these facilities. Owners of such wells must plug and abandon them or install a treatment system under a discharge plan which will treat the effluent sufficiently to meet New Mexico's ground water standards.

In 1991 the OCD began requiring discharge permits for oil field industry service. Class V injection wells (industrial leachfields), identified at these facilities are required to be closed if the operator cannot demonstrate that fresh waters are protected from effluent disposal. To date, Class V wells at fifteen oil field service facilities have been closed.

An inventory of operating underground injection wells in New Mexico as of the end of 1997 shows the following:

Class I (industrial effluent disposal)	3
Class II (oil and gas activity)	5572
Class III (mineral extraction)	18
Class IV (unpermittable injections)	0
Class V (miscellaneous)	473

Cleanup Regulation

Section 1203 of the WQCC regulations imposes notification and corrective action requirements on any unpermitted discharger of any water contaminant. The majority of discharges currently handled under this regulation are spills of petroleum products, sewage and industrial chemicals.

Relatively minor discharges handled under a WQCC § 1203 Corrective Action Report and are closed out in a short period of time, usually under 180 days. For cases that cannot be cleaned up to standards in 180 days, NMED and OCD may require the submission of an abatement plan pursuant to Subpart IV of the WQCC regulations. For more complicated cases, NMED uses the Toxic Sites Triage System, a multi-media risk-based numerical priority model to assign case priorities. Because of limitations of staff at both NMED and OCD, only the most serious problems are assigned active case status (Figure 18).

The State always requests voluntary remedial action by the responsible party to bring affected ground water back into compliance with WQCC regulations. If voluntary compliance cannot be obtained, enforcement is used as a last resort.

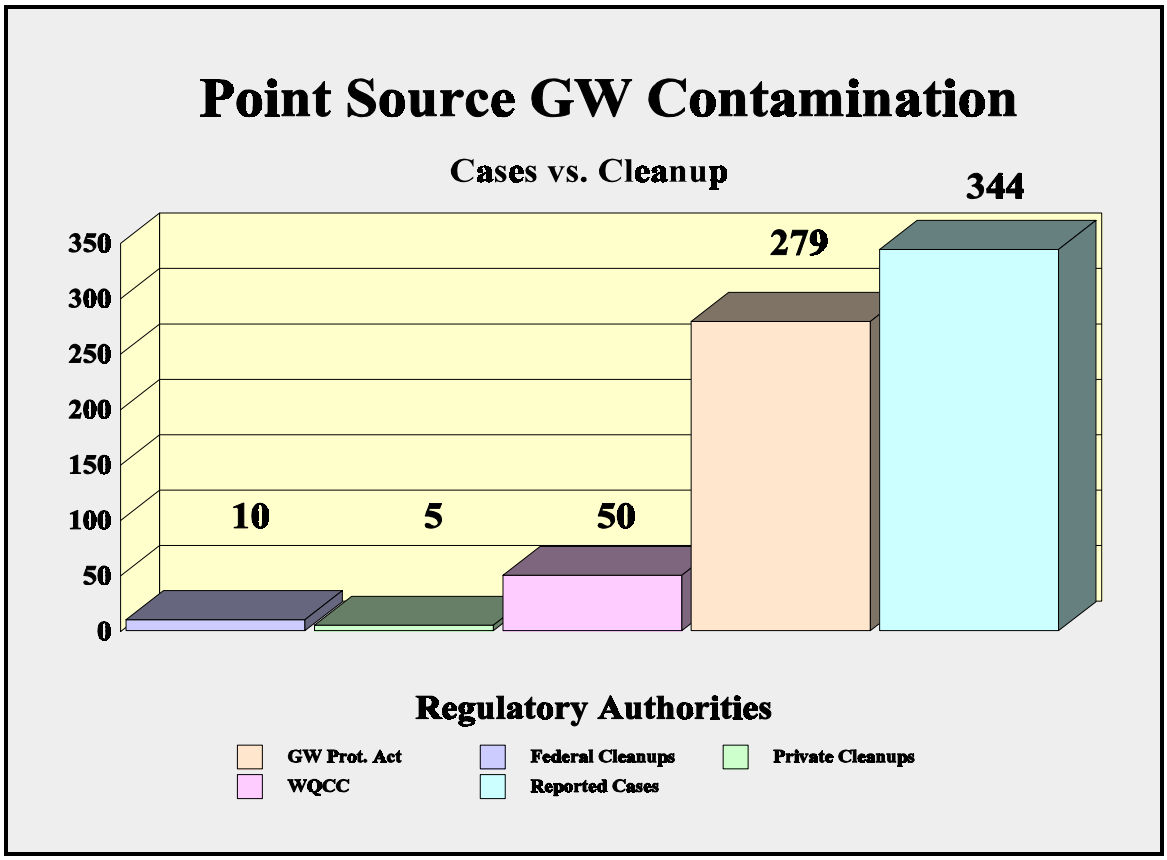


Figure 18. Point Source Ground Water Contamination Cases in Relation to Cleanup Efforts by Regulatory Authority.

Enforcement of Water Quality Control Commission Regulations

Enforcement of WQCC regulations for ground water pollution control are pursued as resources permit. Major enforcement efforts are aimed at assuring that intentional discharges of sewage, industrial and mining effluents, milking barn washdown, and other effluents are in conformance with discharge permit requirements, which in turn should assure that ground water will not be degraded beyond standards. Other major enforcement efforts are aimed at requiring responsible parties to address pollution caused by leaks, spills, or other discharges not made in conformance with regulations.

In general, three methods for achieving compliance with regulations are used by the State. These include attempts to obtain voluntary compliance, including notices of noncompliance, settlement agreements, and negotiated 'assurances of discontinuance', which must be approved by the WQCC to become effective; issuance of Notices of Violation and compliance orders; and civil law suits filed in State district court under the Water Quality Act or applicable portions of the Public Nuisance Statute (c.f., §§ 30-8-3, 30-8-12, NMSA 1978) or both (including negotiated settlement agreements filed with the court pursuant to those suits).

The Water Quality Act was amended in 1993 to provide constituent agencies of the WQCC with the authority to issue compliance orders which can include administrative penalties (§ 74-6-10. A. and C. NMSA 1978). Compliance Order authority provides both a deterrent to future illegal activities as well as providing a more rapid enforcement capability when voluntary compliance cannot be achieved.

NEW MEXICO OIL AND GAS ACT

In addition to the WQCC regulations, OCD administers several water protection programs under the Oil and Gas Act. The Act authorizes OCD to "regulate the disposition of water produced or used in connection with the drilling for or producing of oil and gas, or both, and to direct surface or subsurface disposal of such water in a manner that will afford reasonable protection against contamination of fresh water supplies designated by the State Engineer" (§ 70-2-12.B (15) NMSA 1978). The designation by the State Engineer generally protects all streams

and surface waters and all ground water having 10,000 mg/L or less total dissolved solids, except for those ground waters having no present or reasonably foreseeable beneficial use.

The OCD requires that permits be obtained statewide for drilling, for waste oil treatment plants and for commercial and centralized surface waste disposal. Most regulated activities allow for a public hearing to be requested before permit issuance.

Statewide rules require surface disposal of oil and gas related waste (including produced water, sediment oil, and drilling fluids) to be performed in a manner which prevents contamination of fresh water. For certain geographic areas of the State, specific rules have been adopted that prohibit or limit certain disposal practices. Examples include limitations on disposal of produced water into unlined pits in southeastern New Mexico beginning in 1969, and in northwestern New Mexico beginning in 1985. In 1986, rules were adopted to require permits for commercial and centralized produced water disposal facilities in the San Juan Basin of northwestern New Mexico. In 1988, extensive statewide rules for licensing of commercial surface waste disposal facilities were adopted.

The Oil Conservation Commission in January 1993 adopted Order R-7940C, a set of stringent rules governing the disposal of produced water from oil and gas wells. These rules expand previously defined vulnerable ground water areas, create wellhead protection areas and prohibits the disposal of oil and gas wastes and water into unlined pits in vulnerable ground water areas in northwestern New Mexico. Order R-7940C prohibits disposal of all oil and gas wastes into unlined pits in these areas and requires existing pits to be closed in accordance with OCD regulations and guidelines. In 1993 the OCD issued Surface Impoundment Closure Guidelines which provide recommended risk-based cleanup levels and closure procedures to be used in the closing of surface impoundments and for remediation of leaks, spills and releases. An additional fresh water related problem currently receiving attention is the large number of production wells that have been shut in or temporarily abandoned. The reason for this increase is that the lower price of oil and natural gas since 1985 has led to the shutdown of marginal producing wells. However, these wells cannot be left indefinitely in this condition because natural processes cause casing deterioration that can lead to interstrata communication and possible fresh water contamination. As of the end of 1996, there were 48,022 producing oil and gas wells and 7,420 wells which were shut in. OCD has instituted rule changes to require proper temporary plugging for wells shut in for over six months. Such plugging would be allowed for a maximum of five years without reapproval.

In 1989 amendments to the Oil and Gas Act and to the Environmental Improvement Act (§§ 74-1-1 et seq., NMSA 1978) transferred responsibility for regulating some nonhazardous wastes away from NMED (under authority of the Environmental Improvement Act) to OCD (under authority of the Oil and Gas Act). The wastes now regulated under the jurisdiction of OCD are non-domestic solid wastes resulting from the exploration, development, production, transportation, storage, treatment or refinement of crude oil, natural gas or geothermal energy. These wastes may be generated at production sites, gas plants, refineries and oil field service companies. OCD is required to regulate disposal to protect public health and the environment, and is incorporating review of solid waste practices in discharge plan review and in review of surface disposal applications.

NEW MEXICO HAZARDOUS WASTE ACT

The New Mexico Hazardous Waste Act (§§ 74-4-1 et seq., NMSA 1978) authorizes the Environmental Improvement Board (Board) to adopt regulations for the management of hazardous waste and underground storage tanks (USTs). These regulations are to be equivalent to, and under certain circumstances may be more stringent than, federal regulations adopted by the EPA pursuant to the federal Resource Conservation and Recovery Act (RCRA). However, the Board may adopt regulations for the management of hazardous waste that are more stringent than federal regulations adopted by the EPA pursuant to RCRA, after notice and public hearing, if the Board determines that such federal regulations are not sufficient to protect public health and the environment. Under this authorization, hazardous waste management regulations (which currently incorporate the federal regulations by reference) and underground storage tank regulations have been adopted. These two regulatory programs are described below. This Act also authorizes NMED to take action to protect persons from harm arising from hazardous substance emergency incidents and establishes an emergency fund to be used for cleanup of such incidents. The genesis and makeup of the Board are described in the section on the Environmental Improvement Act later in this chapter.

Hazardous Waste Management Regulations

Under the New Mexico Hazardous Waste Act, the Board adopted the hazardous waste management regulations in 1983, and most recently amended them in 1995. Since these regulations, with their subsequent amendments, are equivalent to EPA's regulations promulgated under RCRA, New Mexico retains authorization to administer most of the federal hazardous waste management program. This program applies to those wastes meeting the specific criteria to be considered 'hazardous wastes' subject to the regulations. Many substances otherwise

considered "hazardous" do not meet these criteria.

The federal Hazardous and Solid Waste Amendments of 1984 (HSWA), which amended RCRA, required significant changes to be made to the New Mexico program if authorization was to be retained. New Mexico legislation enacted in 1987 and 1989 provided the legislative authority to adopt most of the HSWA requirements. Although the State does not have complete primacy to administer HSWA, the State can and does use its authority to enforce State regulations (which mirror federal HSWA-derived regulations) at RCRA facilities. On January 2, 1996, New Mexico received Corrective Action Authorization from EPA in the Federal Register at FR 2450 (1/26/96). EPA provides oversight of these actions.

Administration of the State hazardous waste management regulations is carried out by NMED for all types of facilities, including oil refinement facilities. The regulations provide for 'cradle to grave' tracking and management of materials meeting the definition of 'hazardous waste'. Generators of hazardous waste must have EPA identification numbers, and can dispose of their waste only at an authorized facility.

TSD Facilities

Hazardous waste treatment, storage or disposal facilities (TSDFs) are required to obtain operating permits. Because site-specific detailed permits could not be issued immediately for every TSDF already in operation, EPA created a two-part permit system. Facilities that properly notified and submitted a short form (Part A) permit application were granted 'interim status'; in effect, a temporary operating permit until a site-specific operating permit could be issued. Interim status facilities are subject to a set of category-specific regulations. An interim status facility must either close under an approved closure plan or apply for an operating permit by submission of a 'Part B' application. All TSDFs in New Mexico have either applied for an operating permit or submitted closure plans for their hazardous waste units. In New Mexico, there are thirteen permitted TSDFs, six of which are open burn open detonation operations and three of which are mixed waste permit operations. Eight facilities have submitted applications for post closure care.

A primary intent of the hazardous waste management program is to prevent contamination of water resources by hazardous waste units. Any facility which has a landfill, surface impoundment, waste pile, or land treatment unit which is used to treat, store, or dispose of hazardous waste is subject to ground water monitoring requirements. If ground water contamination does exist, then the permit will specify a corrective action program to halt the escape of hazardous wastes and to restore the ground water, both on-site and off-site.

In New Mexico, the owners and operators of facilities that treat, store, or dispose of hazardous waste are subject to the ground water monitoring requirements.

Small Quantity Generators

An exemption from most of the hazardous waste management regulations is granted to 'conditionally exempt small-quantity generators,' facilities which generate less than 100 kilograms (kg) of hazardous wastes a month. There is also a category of small quantity generator for the generation of between a 100 kg and a 1,000 kg a month. This category must follow more of the regulations than the generator of less than a 100 kg a month but not as many as the generator of more than a 1,000 kg a month. In any case, no facility is allowed to dispose of hazardous wastes on its own property unless it is permitted as a disposal facility. There is currently no authorized disposal facility in New Mexico for off-site hazardous wastes. However, there are two storage transfer facilities within the State to serve as an accumulation point to which the generators can consign their wastes. The storage facility operator finds an appropriate disposal facility and the generator does not have to deal with the disposal facility.

Household Wastes

Household wastes are currently exempt from the hazardous waste regulations, but the disposal of items such as cleaners, thinners, solvents, pesticides poses a threat to the ground water beneath local landfills and surface waters down gradient from such landfills. The City of Albuquerque periodically sponsors household hazardous waste collection events. During these events, household wastes are accepted by a City contractor, packaged and shipped to an approved disposal facility. Such projects should become more common as other municipalities become aware of the hazards to ground water posed by even relatively small quantities of domestic waste items.

Underground Storage Tank Program

In New Mexico, there are an estimated 4,252 underground storage tanks (USTs). NMED is currently aware of 2,216 past and current cases of soil contamination including 639 documented cases of ground water contamination resulting from leaking USTs (LUSTs) through reports from NMED inspectors, voluntary reporting and complaint investigations. Approximately 39 public wells, 47 private and 150 water supply wells have been contaminated or threatened by LUSTs. Approximately 65% of active tanks now meet the December 22, 1998 standards for construction, operation and leak detection. As the reminder of tanks are removed, renovated or replaced, the UST bureau expects a higher than average percentage to have releases requiring corrective action.

Although USTs are located throughout the State, they are predominantly associated with service stations, petroleum suppliers, and government facilities, all of which tend to be located in population centers. These population

centers in turn are concentrated near surface water and vulnerable aquifers in river valleys characterized by permeable, unconsolidated sediments and shallow water tables. Without monitoring, a leak can go undetected for years, thus creating severe environmental and health problems that might easily have been remedied initially.

New Mexico UST Program

Requirements to report and cleanup leaks and spills from LUSTs and other sources that might impact water quality have been part of the WQCC regulations for many years. In 1987, the New Mexico Hazardous Waste Act was amended to give NMED specific authority to control many more aspects of USTs. This program applies to any owner or operator of an UST system which contains a regulated substance, including petroleum products and hazardous substances, with very few exceptions.

NMED is responsible for ensuring that the environment and public health are not threatened by operation of underground storage tanks. This is accomplished by both prevention and corrective action activities including:

- inspecting the installation, operation and removal of USTs in the State;
- requiring upgrade of all USTs by December 22, 1998;
- investigating suspected and confirmed releases from USTs, and overseeing the cleanup of resulting contamination;
- implementing a public education program, which includes an annual conference and trade show, and extensive use of the Wold Wide Web;
- administering a Corrective Action Fund which is used to remediate contamination caused by leaking underground storage tanks, and which significantly relieves tank owners and operators of the financial burden of taking corrective actions;
- rigorously enforcing regulations requiring presence and operation of leak detection mechanisms;
- development and use of innovative remediation technologies that ensure technically adequate and cost-efficient cleanups; and
- certifying both tank installers and scientists performing corrective action on behalf of tank owners and operators.

New Mexico UST Regulations

The New Mexico Underground Storage Tank Regulations were adopted by the Environmental Improvement Board in phases starting in 1989. By 1991, the State had in effect regulations covering the following areas: registration of tanks, assessment of fees, new and upgraded UST systems, general operating requirements for UST systems, release detection, reporting and corrective action; closure of USTs, financial responsibility for tank owners, and certification of tank installers. In 1990 certain provisions of the regulations were found to be more strict than the federal requirements which is a violation of the Hazardous Waste Act. To remedy the situation, the Board adopted those federal requirements by reference. At the present time the UST Regulations are being revised to better clarify the existing regulations, adopt new revisions including the implementation of risk-based decision-making which enable the UST Bureau to better focus its resources on sites where the risk to public health and the environment are greatest, and the addition of new options that local governments can use to meet their financial responsibility requirements.

GROUND WATER PROTECTION ACT

The Petroleum Storage Cleanup Act, enacted by the New Mexico Legislature in 1988, was repealed in 1990 and replaced with the Ground Water Protection Act (§§ 74-6B-1 et seq., NMSA 1978). The new act provides a State Corrective Action Fund for corrective action at sites contaminated by the contents of leaking underground storage tanks. It also recognizes that the owners and operators of facilities containing underground storage tanks must, under federal law, provide financial assurance and allows the "Corrective Action Fund" to serve that purpose as well. In 1991, the Ground Water Protection Act was amended to define "owner" as owner of an underground storage tank rather than owner of a site containing an underground storage tank, and allow for reimbursement of tank owners and operators for costs of corrective action.

EMERGENCY MANAGEMENT ACT

The Emergency Management Act, (§§ 74-4B-1 et seq., NMSA 1978) as amended in 1986 and again in 1989, is the statutory authority for New Mexico's hazardous materials emergency response program. Under the Act, the State government has the primary responsibility for management of hazardous materials incidents, including incidents contaminating surface or ground waters. Local governments assist the State in performing emergency response functions in their respective jurisdictions. The 1989 amendments provided that the Secretary of the New Mexico Department of Public Safety shall have the final authority to administer the provisions of the Act, and shall serve as the central coordinator to direct the response function of the State agencies which may be involved in a hazardous materials or radiological incident.

Under the authority of the Act, New Mexico developed a Hazardous Materials Emergency Response Plan (**4**) which defines procedures and response

functions of various State agencies. NMED is one of the agencies with responsibility for providing information necessary to control and mitigate hazardous materials and radiological discharge incidents.

NMED attempts to provide such information to those on-site entities at any incident which threatens the quality of the environment, or poses a threat to public health or safety. NMED contracts with the New Mexico Health Department's Epidemiology unit to receive and properly refer emergency incident reports. During a hazardous materials or radiological incident, NMED may provide technical assistance and advice, provide for environmental monitoring and sampling when necessary, ensure that adequate cleanup is performed, and take appropriate enforcement action. NMED staff, however, do not enter the exclusion zone during a hazardous materials or radiological incident. A contract is maintained with one or more firms with emergency response capability to furnish immediate response to emergency incidents. Work under contract is funded through the Hazardous Waste Emergency Fund established by § 74-4-8 of the New Mexico Hazardous Waste Act.

NEW MEXICO ENVIRONMENTAL IMPROVEMENT ACT

The New Mexico Environmental Improvement Act (§§ 74-1-1 et seq., NMSA 1978) was enacted in 1971. It established the Environmental Improvement Division (EID) of the Health and Environment Department. In 1991 EID was elevated to Executive Office Cabinet-level status and redesignated the New Mexico Environment Department by the first session of the 40th Legislature. The Environmental Improvement Act also established the Environmental Improvement Board, consisting of five members appointed by the Governor for terms not to exceed five years, and gave the Board authority to promulgate regulations in numerous areas relevant to environmental management and consumer protection. Among regulations adopted by the Board are several affecting ground water quality, including those described above in the section on the Hazardous Waste Act, as well as Liquid Waste Disposal Regulations, Solid Waste Management Regulations, and Regulations Governing Water Supplies.

Liquid Waste Disposal

Liquid waste is the wastewater discharged from homes and other establishments and normally includes wastes from toilets, baths, dishwashers, clothes washers, sinks and garbage disposals. In situations where such wastes cannot be disposed of through a community sewage treatment plant, treatment and disposal must be accomplished through individual facilities. The potential problems from such systems vary depending upon a number of factors, including the type and design of the system, the amount of waste to be discharged, nearness to surface or ground water, amount of precipitation, type of soil, area and slope of land involved, and pollutant loading density due to other discharges in the area.

In New Mexico it is estimated that there are over 175,000 on-site liquid waste disposal systems, serving approximately 460,000 people statewide. Approximately 6,000 new systems are installed each year according to program permitting records. The large majority of such systems ultimately discharge to ground water. Bacteriological, viral, and chemical ground water pollution can result from improperly sited, designed, constructed, and/or maintained individual liquid waste systems. More than one-half of the recorded cases of ground water contamination in New Mexico are attributed to on-site liquid waste systems.

Liquid Waste Program Regulations

NMED's liquid waste program is directed at preventing and abating adverse environmental and public health effects from individual liquid waste systems receiving, treating, and disposing of up to 2,000 gallons of domestic wastewater a day. The large majority of such systems are 'conventional' systems consisting of a septic tank and drainfield serving a single residence. Where the standards cannot be met with installation of a conventional system due to site limitations, one of various recognized 'alternative' systems may be required. By nature, nearly all such systems are buried, which makes their location, configuration, performance, and even existence difficult to determine. Their major negative environmental impact, degradation of ground water quality, is gradual, cumulative, and extremely difficult to legally prove or to correct.

The Liquid Waste Disposal Regulations (LWDR) were first adopted by the Board in 1973, and were most recently amended in December 1989. They contain specific requirements that each system include a treatment unit and be situated in conformance with standards designated to protect surface and ground water from degradation. The regulations include provision for granting variances to the requirements in cases where it can be shown that site-specific conditions or additional treatment processes exist which will provide adequate protection. The regulations also allow the imposition of more stringent requirements where necessary to prevent a hazard to public health or the degradation of a body of water. The LWDR cover only systems that are exempt under the WQCC regulations which cover any system receiving more than 2,000 gallons a day design flow or any non-domestic waste.

Enforcement

Enforcement activities generally result from information contained in a complaint to the local NMED office

concerning a failed system or an improper installation. Nearly all complaints are followed up, and nearly all discovered violations are voluntarily corrected by the system owners without court action. It should be noted that the violations most commonly found are obvious ones, such as system installation without a permit, improper proximity of a system to a well or watercourse, system failure such that raw sewage reaches the soil surface, or improper dumping of septage. Systems existing prior to November 1973, were 'grandfathered-in' and, as a consequence, so were any potential problems associated with them. Problems and complaints about these earlier systems concern cesspools, surfacing sewage, overflowing tanks, and illegal pumping. Correction of such problems often involves modification of the existing system or providing for new installations.

Density of Liquid Waste Systems

The principal method for limiting the impact of microbiological and soluble chemical contaminant pollution due to liquid waste systems is to restrict the density of systems. Many subdivisions were platted, approved and sold prior to the adoption of the current liquid waste disposal regulations. Lots platted prior to February 1, 1990 complying with the requirements of minimum lot size standards in effect at the time of their platting are allowed to be developed with a single house per lot **(5)**. While real estate developers have generally sought to subdivide property to the highest density legally permissible, this has resulted in restricting purchasers to using expensive alternative systems or using community subdivision wastewater systems. A certain number of lots exist which are simply not appropriate for conventional on-site systems, yet people desire to build and live on these lots. In such instances, alternative systems, lot expansions and legitimate variance allowance must be considered.

Local city and county governments have legal authority for zoning and subdivision approval, as well as authority to adopt environmental protection standards more stringent than the State's, if necessary. In those areas of environmental sensitivity or current ground water problems, the counties and municipalities are encouraged to exercise their authority to prevent further local degradation of ground water. NMED is seeking local government cooperation in requiring evidence of an approved NMED liquid waste permit before issuing building or mobile home moving permits. This would insure a higher percentage of installations meeting standards.

Septage

Another problem associated with liquid waste disposal is the disposal of the residual solids (i.e., septage) from septic tanks. Regular pumping of septic tanks is encouraged to preserve the capacity, and treatment efficacy, of disposal systems. Traditional methods for septage disposal (i.e., to municipal wastewater treatment plants and landfill pits) are facing increasing question as to their environmental safety. Municipal wastewater treatment plants face ever increasing pressures for compliance with stricter NPDES effluent limitations, and are sometimes unwilling to bear the costs associated with treating septage. Landfill operators are faced with legal liability for contamination from septage disposal and find that public land administrators are less willing to take the liability associated with accepting septage disposal to pits. Also, the New Mexico Solid Waste Management Regulations ban disposal of liquids at landfills. In the arid southwest, the most environmentally beneficial method of disposal of septage derived from residential sources would involve wide-area land application with incorporation into the soil in areas where there is no threat to surface or ground waters. However, this procedure has largely been precluded by EPA's technical criteria for sludge (including septage) which was published in October 1991 pursuant to the federal Clean Water Act. The number of septage disposal sites for which approval was applied for under WQCC regulations has continued to increase in the most recent biennium, but the number of approved sites still falls far short of the need. Illegal dumping of septage into sewers, watercourses, or arroyos is practically impossible to prevent. Such practices will predictably increase unless safe, legal methods are defined and promoted. NMED is in the process of developing septage tracking regulations which will help to minimize illegal dumping of septage in unpermitted areas.

Water Supply Regulations

The Water Supply Regulations, adopted by the Board and which follow the Federal Primary Drinking Water Regulations, apply to public water supply systems. The State of New Mexico was granted primacy for the enforcement of regulations governing water supplies pursuant to the federal Safe Drinking Water Act on April 1, 1978. The State regulations have been, and will continue to be, further amended to meet the requirements of the SDWA amendments of 1996 if the State wishes to retain primacy.

As an example of how the State is supporting local communities in meeting these standards is the Composite Correction Program (CCP) **(6)** which is an approach developed by the EPA and Process Applications, Inc. to improve surface water treatment plant performance and help assure cost-effective compliance with the Surface Water Treatment Rule (SWTR) which is included in the New Mexico Water Supply Regulations. The SWTR, which took effect on June 29, 1993, requires a minimum 3 log (99.9%) removal/ inactivation of giardia cysts, a minimum 4 log (99.99%) removal/inactivation of viruses, requires lower finished water turbidity, and requires minimum levels of disinfection. These requirements are also listed in the NMED Primary Drinking Water Regulations.

The CCP approach consists of two

aspects, the Comprehensive Performance Evaluation (CPE) and Comprehensive Technical Assistance (CTA). A CPE is a thorough evaluation of an existing treatment plant resulting in an assessment of the unit treatment process capabilities and the impact of the operation, maintenance and administrative practices on optimal performance of the plant. CTA is used to optimize the performance of an existing plant by addressing the factors limiting performance which were identified during the CPE. The CCP approach can be utilized to evaluate the ability of a water filtration plant to meet the turbidity and disinfection requirements of the SWTR.

The New Mexico State University (NMSU) Doña Ana Branch Water Utilities Technical Assistance Program has been contracted by NMED's Drinking Water Bureau to implement the evaluation and technical assistance process at surface water treatment facilities in New Mexico.

The Safe Drinking Water Act was amended in 1996 (PL 104-182) and established new guidelines for the protection of the nation's public water systems. Congress, in amending the act, was relying on a good working partnership between the States and the EPA to carry out these new provisions. The 1996 Amendments include, among other things, the following:

. Elimination of mandatory additional water quality standards (standards for 25 new contaminants every three years). Provisions for national regulation if the contaminants exist in significant and sufficient areas to warrant regulation (§ 1412 SDWA);
. Incorporating risk assessment and good scientific data as criteria for establishing standards. Include was the provision for increased flexibility for states to tailor monitoring and treatment requirements for all water systems and to grant variances and waivers to small systems (§ 1412 SDWA);
. Specification of minimum standards for certification (and recertification) of the operators of community and noncommunity public water systems (§ 1419 SDWA);
. Establishment of a Capacity Development Program for the states. In New Mexico, the capacity development program is operated by the Environmental Finance Center through the New Mexico Engineering Research Institute/ University of New Mexico. The long term goal of this project is to create a more reliable and consistent method of evaluating small water systems viability and to provide information to the State which will ultimately improve the focus and application of technical assistance and funding to small water systems (§ 1420 SDWA);
. Provisions for a federal financial assistance program administered by the States as a Drinking Water State Revolving Loan Fund. This fund would provide low interest loans to water systems for capital improvements and other activities (§ 1452 SDWA); and
. More emphasis on proactive protection of sources for drinking water rather than the reactive after the fact detection and treatment (§§ 1429, 1453 and 1454 SDWA).

Most requirements of the State regulations pertain to the quality of water delivered (i.e., end of pipe) by public water supply systems. Other provisions provide for protection of public health by setting requirements for siting, construction, operation, and maintenance of public water supply systems. The State regulations have been, and will continue to be, further amended to meet the requirements of the SDWA amendments of 1986 if the State wishes to retain primacy.

The first session of the 39th Legislature empowered NMED to collect fees from water systems for services provided to water systems to assist in complying with the new requirements. In the Fall of 1989, a fee structure was established to fund NMED services requested by water systems in pursuit of compliance with the Amendments.

NEW MEXICO SOLID WASTE ACT

New Mexico has responded to increasing discoveries of ground water pollution below old landfills and the additional perceived threat of large scale disposal of other states' solid waste in New Mexico.

In 1990, the State Legislature passed the Solid Waste Act. This new law (§§ 74-9-1 through 74-9-42 and §§ 74-9-72 through 74-9-73, NMSA 1978) mandated development of a comprehensive statewide solid waste management program. It also authorized NMED to impose fees for processing permit applications, seek increased penalties for noncompliance and expand facility requirements for permitting and financial responsibility. The Act was amended in 1993 and required local governments to provide financial assurance and established permit life criteria for private and public entities while expanding the public notice requirements to tribal governments. In October of 1991, EPA promulgated the federal Part 258 requirements for municipal landfills which became effective in October of 1993. Certain options were provided to states which could demonstrate that their permit programs were sufficient to implement requirements equivalent to the federal criteria. In response to the amendments to the Solid Waste Act, the promulgation of the federal criteria, and recommendation provided in a statewide solid waste management plan, the Environmental Improvement Board adopted extensive amendments to the regulations on July 8, 1994. The regulations became effective on August 17, 1994. Application to EPA for federal approval of the State program was made on July 18, 1994 was received on December 21,1994.

The Solid Waste Management Regulations establish permit requirements for landfills, recycling facilities, processing facilities (preparation of waste for reuse), special waste (waste with unique handling, transport or disposal requirements ~ such

as asbestos and infectious waste), composting facilities, transformation facilities (e.g., incinerators, distillation and gasification operations) and transfer stations. Particular categories of waste handling and disposal facilities are governed by specific siting and design criteria, operational requirements and closure and postclosure requirements. Financial assurance is required for closure and postclosure care and ground water monitoring. Certified operators are required for most solid waste facilities. Where monitoring wells show ground water contamination, remediation is required. Numerical standards for water quality parameters are established, and for contaminants with potentially serious health, safety or environmental effects, remedial action levels are generally set at 75 percent of the standards. The standards adopted by the Board are at least as stringent as those adopted by the WQCC.

Solid Waste Disposal

The most widely used method of solid waste disposal is land disposal. As of December 1996, there are approximately 64 active landfills operating in New Mexico of which 54 are municipal, and ten are privately owned. Since 1989, approximately 130 landfills have closed, with a number of them being replaced with collection devices or transfer stations for eventual transport to other landfills. More landfills are expected to close to avoid the additional requirements imposed by the 1994 regulations, which are equivalent to the federal Part 258 requirements. It is expected the requirements of the Act and regulations will result in fewer, larger, better located sites which will afford significantly increased protection of water resources.

OTHER STATE PROGRAMS

There are several other State programs that contribute to the protection of ground water quality. These are summarized below and also are listed in Appendix E.

Coal Surface Mining Regulations

The protection of ground water quality at coal mines is controlled under the Coal Surface Mining Regulations adopted by the Coal Surface Mining Commission pursuant to the New Mexico Surface Mining Act (§§ 69-25A-1 et seq., NMSA 1978). The regulations are administered by the Mining and Minerals Division of the Energy, Minerals and Natural Resources Department. This Division also administers programs under the Abandoned Mine Reclamation Act (§§ 69-25B-1 et seq., NMSA 1978).

Hard Rock Mining Regulations

Permitting of hard rock mines is required pursuant to the New Mexico Mining Act (§§ 69-36-1 to 69-36-20 NMSA 1978) which is administered by the Mining and Minerals Division of the Energy, Minerals & Natural Resources Department. Rules to implement the Mining Act were adopted by the newly created Mining Commission in 1994. New and existing mining operations and exploration operations must obtain Mining Act permits which include reclamation or closeout requirements. Issuance of these permits is closely coordinated with other established regulatory programs which the new reclamation and closeout requirements complement but do not supersede. A requirement of the Mining Act is that the Secretary of NMED provide a determination that environmental standards, including water quality standards, are expected to be met before a new mine permit or a closeout plan for an existing mine can be approved.

Comprehensive Ground Water Protection Program

NMED coordinates a WQCC subcommittee whose purpose is to develop a comprehensive State ground water protection program. The group is using a combination of materials already available (the New Mexico Ground Water Protection Strategy, the draft New Mexico Ground Water Protection Profile, and the EPA's Final Comprehensive State Ground Water Protection Program Guidance), along with voluntary input and participation from federal, State, regional, local and tribal governmental agencies with ground water responsibilities as well as input and participation from private industrial and agricultural concerns and the general public to create as far-reaching and significantly interactive a program as possible. This effort will include both Core and Fully-Integrating sets of criteria in six strategic areas of activity as outlined by EPA guidance to establish and develop the program. The New Mexico Comprehensive Ground Water Protection Program received WQCC approval in June, 1994.

Pesticide Use and Disposal

The use and disposal of pesticides is controlled under 21 NMAC 17.50 under the Board of Regents of NMSU. This order was adopted pursuant to the Pesticide Control Act (§§ 76-4-1 et seq., NMSA 1978) and is administered by the Division of Agricultural and Environmental Services of the NM Department of Agriculture. This regulatory order does not include specific provisions to protect ground water quality. However, the Department of Agriculture is developing a generic Pesticides State Management Plan Guidance for Ground Water Protection which will focus on management of pesticides to prevent negative health and environmental effects.

Office of the State Engineer

The New Mexico Office of the State Engineer has authority under several statutes (§ 69-3-6, § 70-2-12.B (15), §§ 72-12-1 through 72-12-28, § 72-13-4 and § 72-13-6, NMSA 1978) to control activities affecting ground water quality. New Mexico Supreme Court decisions have further defined this authority (Appendix E). The State Engineer has

general supervision of certain water quality issues in the State. His office has authority over plugging mine discovery or drill holes, drilling, casing, and plugging artesian wells to prevent commingling, pumpage control to prevent salt water encroachment, and designation of aquifers to be protected by the Oil Conservation Division.

The 1991 Legislature amended State law to provide that periods of non-use during which water rights are placed in a water conservation program approved by the State Engineer and prepared by a conservancy district, acequia or community ditch or the Interstate Stream Commission (ISC) are not computed as part of the four-year forfeiture period.

In 1987 the New Mexico Legislature authorized the ISC to appropriate ground water or purchase water rights on behalf of the various regions of the State and to make grants or loans for the purpose of regional water planning. The purpose of the regional water planning effort is to identify future water needs and to develop information needed to conserve water for future use. Since 1987 the Legislature has appropriated over $2,500,000 for the preparation of regional plans, for an update of the State water resources assessment data and for the initiation of a State water conservation program. These monies have been matched by approximately $500,000 in local funding plus many thousands of dollars of in-kind services and volunteer time. This program has funded initial water planning efforts in water planning regions that cover 32 of New Mexico's 33 counties as well as several water assessment studies and water conservation demonstration projects. The program has also funded the development and distribution of related educational materials.

State Land Office

The New Mexico State Land Office (SLO) administers approximately 9,000,000 acres of surface estate and 13,000,000 acres of mineral estate held in trust for New Mexico schools, universities and other beneficiaries. By State statute, the agency is required to maximize the longterm return to the Trust and protect the resource. The SLO is not authorized to expend Trust funds for improvement of Trust Land; however, federal Agricultural Stabilization and Conservation Service funds or private funds may be expended by lessees to improve Trust Lands.

The SLO has developed and is enforcing reclamation standards for oil and gas development, in addition to a road policy which contains elements of appropriate Best Management Practices designed to control sediment, erosion, and other pollutants. The agency has also revised its sand and gravel lease procedure to (1) require a spill prevention and control plan which outlines leak and spill prevention methods and subsequent cleanup methods of any accidental spills; (2) require water diversion ditches up-gradient and runoff berms downgradient from the operation to prevent sediment runoff; (3) enforce stringent reclamation requirements; and is (4) currently developing the requirement of a systematic field inspection schedule for active sand and gravel leases.

The agency encourages its agricultural lessees to enter into Great Plains Contracts or ranch/farm plans with the federal Natural Resources Conservation Service which provides information and encourages proper range management practices. In an effort to promote the longterm health of New Mexico's range resources, the agency has designed a program which rewards lessees who excel in managing State Trust Lands called the Range Stewardship Incentive Program. The central feature of this voluntary program is a 25 percent fee reduction on each acre in good or excellent condition with a stable or upward trend. By definition, there is minimal erosion and therefore minimal nonpoint source pollution from rangeland in high ecological condition. Approximately 325,000 acres are currently managed under this program.

The agency has made Educational Easements available to schools to provide the opportunity to teach environmental education and enhance student understanding of resource issues and the need for protection of the Trust resource for future generations. The SLO has worked with NMED concerning surface water monitoring and ground water discharge plans and reviews discharge proposals for potential impacts to the Trust resources regarding surface and ground waters. The agency is active in the Upper Rio Grande Basin Ecosystem Management Project, the Zuni River Watershed Project, the Statewide Water Plan, and the Riparian Council. In addition to the above, leasing of State Trust Lands for mining, grazing, rights-of-ways, and commercial use is being reviewed to address biological, archaeological, and other environmental concerns, and to apply appropriate stipulations to the leases in order to protect the quality of ground and surface waters.

Additional programs initiated by the SLO include a riparian improvement program (RIP) whose purpose is to identify, prioritize, and implement restoration projects in riparian areas and associated watersheds located on state trust lands in cooperation with lessees, adjoining land owners, and land management agencies. The SLO has also initiated a program to identify and control noxious weeds found on state trust lands. The program relies on cooperative efforts with land management agencies, county governments, and other interests to prevent to the extent possible the spread of noxious weeds and the consequent loss of productive agricultural lands.

State Corporation Commission

There are several rules and regulations administered by various divisions of the State Corporation Commission which, though principally directed toward other concerns, have peripheral relevance to ground water quality. These include rules and regulations pertaining to distribution, handling and use of flammable liquids, to transportation by motor carrier of hazardous materials, and to transportation of petroleum and petroleum products by pipeline.

FEDERAL PROGRAMS

There are a number of federal programs which contribute to ground water quality protection in New Mexico. Some of these, such as the hazardous waste, underground injection control, and underground storage tank programs, are being carried out by the State under authority of State legislation and are described in the sections on the relevant State acts. Others, such as Superfund, are essentially federal programs in which the State plays a role.

In October 1991 EPA and the Navajo Tribe signed a Memorandum of Agreement which assigned responsibility for implementation of federal environmental programs on the Navajo Nation to EPA's Region IX. This responsibility was previously spread throughout three Regions (VI, VIII and IX), in that the Navajo Nation exists in Arizona, Utah and New Mexico. This may result in a significant decrease in State efficiency resulting from having to deal with multiple programs in Region IX on matters relating to the Navajo Nation, and with the parallel offices in Region VI, for the rest of the State. Statewide matters will require coordination with both EPA regions.

Department of Energy Environmental Oversight and Monitoring Program

The four DOE facilities in New Mexico are Sandia National Laboratories (SNL) and the Lovelace Respiratory Research Institute (LRRI), formerly the Inhalation Toxicology Research Institute (ITRI) in Albuquerque, the Los Alamos National Laboratory (LANL) in Los Alamos and the Waste Isolation Pilot Plant (WIPP) in Carlsbad. The New Mexico Agreement-in-Principle is designed to help assure that activities at DOE facilities are protective of the public health and safety and the environment. To accomplish the goals of the agreement, an oversight program was developed with four primary objectives:

. To assess the DOE's compliance with existing laws including regulations, rules, and standards;
. Prioritize cleanup and compliance activities;
. Develop and implement a vigorous program of independent monitoring and oversight; and
. To communicate with the public so as to increase public knowledge of environmental matters about the facilities, including coordination with local and tribal governments.

The DOE Oversight Bureau carries out the oversight and monitoring activities of the program. Although the Oversight Bureau has no regulatory status, it facilitates compliance with applicable environmental regulations by reporting water quality concerns and infractions to DOE and the appropriate regulatory NMED Bureaus (i.e., Surface Water Quality, Ground Water Quality, and Hazardous & Radioactive Materials). DOE Oversight Bureau staff communicate routinely with the public to increase public knowledge of oversight, monitoring, and environmental issues involving the facilities. The Oversight Bureau issues quarterly and annual implementation reports to the DOE describing the scope of work, objectives, accomplishments and significant issues that occurred during each period. Results of oversight and monitoring activities are also available to the public along with numerous documents transmitting technical comments and concerns relative to specific program areas. These reports and documents are a source of reliable technical information for the writers of facility proposals and decision makers at regulatory agencies.

Ground Water Protection at DOE Facilities

NMED is responsible for preserving, protecting and perpetuating the State's ground water resources for future generations. The oversight program accomplishes this at DOE facilities through review and technical investigation in four broad areas: site wide and site specific hydrogeology, waste management, surveillance and environmental restoration. Oversight Bureau staff evaluate the facility's conceptual hydrogeologic model, review the facility's investigations to improve their conceptual model and conduct studies necessary to better understand the hydrogeologic systems and to support technical recommendations at the facilities.

One of the early NMED deliverables in the oversight program was an assessment of the ground water surveillance at each facility. This involved evaluating the adequacy of existing ground water monitoring networks and practices at the facilities, in view of their hydrogeologic setting and the location, number and character of waste disposal sites. On-going surveillance activities include sampling and co-sampling of ground water at wells and springs; compiling a database of previous analytical results, as well as determining and investigating any trends in the concentration of constituents of concern.

Los Alamos National Laboratory is located west of the Rio Grande, forty miles northwest of Santa Fe, in Los Alamos County, New Mexico. The lab sits on the Pajarito Plateau, an elevated area of volcanic deposits and sedimentary fill of the Española Basin. The plateau consists of a series of finger-like mesas formed by deep dissection of the various canyons. The average altitude of the mesas is approximately 7,000 feet above sea-level. The area is drained by ephemeral and intermittent streams that flow easterly to the Rio Grande, lying some 1,450 feet below the plateau.

Hydrogeologic Setting at LANL

The regional ground water system in the Los Alamos area is associated with the basalts of the Cerros del Rio, Tschicoma, Puye or Tesuque Formations, depending on location. These collectively make up the so-called "main aquifer". This deep ground water flows eastward toward discharge areas along the Rio Grande. Perched saturated zones occur within the Bandelier Tuff, the alluvium in canyons and the basalts and sedimentary units in the upper part of the Puye Formation.

Water Supply at LANL

The public water supply at LANL is provided by a system connecting four well fields tapping the regional or main aquifer **(8)**. The depth of the wells ranges from 870 to 3,093 feet. The depth to water after drilling ranged from zero (flowing well) to more than 1,200 feet.

Ground Water Quality at LANL

Analytical results for samples taken by the DOE Oversight Bureau show that ground waters in the Los Alamos area locally contain anthropogenic constituents, such as volatile organic compounds, high-explosive compounds, radionuclides and selected trace metals. Although concentrations of these constituents in the deep regional ground water are below federal and/or State maximum contaminant levels (MCL's) for drinking water, their presence is evidence of hydraulic communication between the perched and regional saturated zones. Concentrations in perched ground water have exceeded MCL's. Strontium-90 and nitrate/nitrite as nitrogen have been found in perched alluvial water at levels as high as 14 and 6 times EPA's drinking-water MCL's respectively. Perched water in canyon alluvium is considered a source for the spread of contaminants.

Site-Specific and Sitewide Hydrogeology Activities at LANL

Investigations are being conducted in Canon de Valle, Los Alamos, Pueblo and Pajarito Canyons to characterize the geology, hydrogeology and hydrochemistry. These activities are conducted under ER Programs such as canyon characterization work plans and potential release site corrective measures. Data from these investigations will be used in sitewide studies such as ground water flow and contaminant transport modeling.

Sitewide activities conducted under LANL's Hydrogeologic Work Plan (1997) include the drilling of three deep-aquifer characterization boreholes. The boreholes have not been completed as monitoring wells; however, LANL and associated stakeholders such as NMED are negotiating the final strategy. LANL plans on drilling two new deep wells during fiscal year 1999. NMED collected split samples from two of the three boreholes, and data show man-made and/or elevated concentrations of natural occurring compounds in the intermediate and deep saturated zones. It should be noted that the sample quality and associated data may not be adequate due to the sampling methods (e.g., sampling while drilling).

The DOE Oversight Bureau's sitewide hydrogeologic activities included:

1) The acquisition of background hydrochemical data specific to perched aquifers within the Bandelier Tuff and canyon alluvium for use in conjunction with future background ground water studies conducted by LANL, and
2) Infiltration studies along the Pajarito Fault Zone to quantify the amount of recharge or leakage across the fault boundary and correlate results with discharge from down-gradient springs.

Surveillance Activities at LANL

As part of their surveillance program, LANL monitors ground water quality at seventeen wells and various springs associated with the deep aquifer, 21 wells in the canyon alluvium and four wells and several springs in other perched zones **(11)**. Nine of the deep aquifer wells are unsuitable for monitoring as they were constructed for supply and have long screened intervals. Several of the springs monitored for the deep aquifer may actually discharge from a perched saturated zone **(10)**.

The DOE Oversight Bureau continues to split samples with LANL at many of these stations, and collects independent samples at many onsite and offsite springs and wells.

Environmental Restoration

LANL's ER group continues to perform drilling and sampling activities in many of the canyons and at several potential release sites. The bulk of the work has been restricted to the many shallow-perched systems; however, ER has recently drilled three new deep-aquifer boreholes.

DOE Oversight Bureau's ER activities included both sampling and document review. Split samples were collected at three deep-aquifer boreholes, three intermediate wells, ten alluvial wells and three springs. The DOE Oversight Bureau provided technical comments on LANL's Hydrogeologic Workplan and Work Plan for Mortandad Canyon.

Sandia National Laboratories is located on Kirtland Air Force Base along the southeastern border of the City of Albuquerque, New Mexico, about five miles east of the Rio Grande. SNL lies on the east-central margin of the Albuquerque Basin. Elevations at KAFB vary from about 5,200 feet near its west border to about 8,000 feet in the adjacent Manzanita Mountains to the east. The median elevation of the KAFB area is approximately 6,454 feet above sea level.

Hydrogeologic Setting at SNL

Precambrian basement rocks, overlain by Pennsylvanian-Permian sedimentary rocks, are exposed in the foothills and the Manzanita Mountains adjacent to KAFB **(16, 17)**. In general, this entire sequence of rocks is uplifted and tilted towards the east. Tertiary/Quaternary sediments of the upper Santa Fe Group, deposited by several alluvial fan systems, constitute the principle basin fill in the KAFB area **(18)**. These alluvial fan sediments overlie and, at depth, intertongue with axial fluvial deposits of the ancestral Rio Grande near the western border of KAFB.

Basin-fill alluvium is the sole source of drinking water for New Mexico's largest metropolitan area. East of the major range-front faults, along the pediment and in the canyons, depth to ground water averages about a 100 feet. West of these faults, the water table is deeper, lying at depths varying from about 500 to 600 feet. Regional ground water flow in the KAFB area is generally westward, with a northerly component near the public supply wells.

Water Supply at SNL

The public water supply system at SNL is operated by KAFB. Five remote SNL field sites not connected to the KAFB system are supplied by "water buffaloes": two 5,000 gallon tanks hauled by truck.

Ground Water Quality at SNL

Ground water contamination is known to exist at TA-5, TA-2, and the Chemical Waste Landfill (CWL). The status of each of these areas is briefly summarized under *Environmental Restoration* below. Trichloroethylene (TCE) has been detected in SNL monitor wells at three ER areas: CWL, Liquid Waste Disposal System (LWDS), and at TA-5. Ground water with nitrate content exceeding drinking water standards is found locally at some SNL ER sites , KAFB Installation Restoration Project (IRP) sites, and in the Tijeras Arroyo channel at the western boundary of KAFB.

In late 1995, TCE contamination in ground water was discovered by SNL at several sitewide monitor wells located in the north-central part of KAFB in the vicinity of TA-1 and TA-2, an area referred to as Sandia North. The DOE Oversight Bureau coordinated with SNL on new well locations to investigate the sources and delineate the contamination. By fall of 1998 SNL had installed a total of 23 monitor wells in the Sandia North area.

Sitewide Hydrogeology Activities at SNL

The DOE Oversight Bureau's initial review of ground water monitoring at SNL raised concerns regarding the facility's conceptual hydrogeologic model for the KAFB area (**19**). Under the Site-Wide Hydrogeologic Characterization Project (SWHCP) , SNL conducted various geologic and hydrologic studies and reported on them annually (**20**). The DOE Oversight Bureau evaluated the site-wide conceptual and numerical hydrogeologic models and concluded they adequately represent site-wide conditions. The bureau further recommended that the annual reporting be replaced by periodic updates when new information becomes available.

The DOE Oversight Bureau has reported on its activities that have contributed to a better understanding of sitewide conditions. These include a background hydrochemical study of the KAFB area (**21**), a geochemical analysis of the major rock types contributing detritus to the coalescing alluvial fans on the east side of KAFB (**22**), a hydrochemical study of springs (**23**), evaluations of groundwater monitoring at the CWL (**24**), MWL (**25**), LWDS (**27**), and a hydrogeologic investigation/ monitor well drilling program at LRRI (**28**, **29**, **30**).

Based on investigative work by the DOE Oversight Bureau (**21**) and SNL, consensus was reached in 1997 on background concentrations of chemical constituents in groundwater. These levels can be used to assess environmental impacts from current and historical SNL activities.

The DOE Oversight Bureau's hydrochemical study indicated the presence of two discrete hydrochemical facies in the KAFB area. These are classified as the low-TDS and the high-TDS hydrochemical facies, on the basis of having relatively small or large concentrations of total dissolved solids (TDS). The low-TDS facies constitutes the bulk of the ground water in the KAFB area. In contrast, the high-TDS facies is restricted to the region near the convergence of the Tijeras, Sandia, and Hubbell Spring Faults. The high-TDS facies most likely represents the result of mixing of shallow water in the alluvium with deep ground water migrating upward along faults.

Surveillance Activities at SNL

The SNL Groundwater Protection Program reports all ground water monitoring activities conducted at SNL/NM in Annual Groundwater Monitoring Reports (26). SNL/NM collects quarterly samples for water chemistry analysis from 41 wells one spring. Water levels are measured on a monthly or quarterly basis at 123 SNL, KAFB and City of Albuquerque wells. Of the wells, thirty are completed in the regional aquifer; the other six wells and the two springs are completed/ developed in the shallow, alluvium aquifer.

Environmental Restoration Activities

SNL has a very active ER program. The two sites that have received the most attention to date are the CWL and MWL. However, the discovery of TCE and nitrates in ground water at TA-2 and the LWDS has prompted SNL to consider installation of additional monitor wells at and around these sites. SNL undertook a vapor extraction "voluntary corrective measure" (VCM) at the CWL in 1997 to remove volatile organic compounds from the vadose zone. An excavation VCM of materials buried in the CWL is scheduled in 1998. Excavation of the Classified Waste Landfill at TA-2 began in 1998.

SNL's CWL, encompassing just under two acres, is located in the southeastern corner of TA-3. Beginning in 1962, trenches and surface impoundments at the landfill were used for the disposal of a wide variety of hazardous and chemical wastes. The CWL has been inactive since 1985. The water table occurs at a depth of about 480 feet.

In March 1990, TCE was detected in ground water at the CWL. Subsequently, 1,1,1-trichloroethane (1,1,1-TCA), tetrachloroethene (TCE), toluene, methyl ethyl ketone (MEK), acetone, methylene chloride, and Freon 113 have been periodically detected in several CWL monitor wells. TCE, chromium, and nickel are currently the ground water contaminants of most concern to the NMED.

The initial monitor well network at the CWL was determined to be inadequate (**24**). As of 1997 SNL collects water quality samples from 12 wells, including three nested wells (wells completed at different depths in the same borehole (26).

Water level data from the nested wells at the CWL indicates that the vertical hydraulic gradient exceeds the horizontal gradient by an order of magnitude. Ground water samples collected from the nested wells demonstrate that TCE contamination has moved downward into deeper portions of the aquifer. Currently, insufficient information is available to determine the extent of ground water contamination at the CWL.

The MWL was established in 1959 for the disposal of radioactive, mixed, and hazardous wastes. The landfill, inactive since 1988, is located in the north-central portion of TA-3 and covers a little over two and a half acres. Although records are incomplete, SNL reports that acids, metals, organic solvents, scintillation cocktails, uranium, thorium, transuranics, fission products and tritium may have been disposed of at the landfill. The water table at the MWL lies at a depth of approximately 460 feet. Ground water contamination has not been detected at the MWL. The monitoring well network may not be currently adequate, primarily because of uncertainties about the hydraulic gradient and direction of ground water flow (**25**).

The LWDS lies about two miles south of Albuquerque in and near TA-5. It consists of two surface impoundments located outside of TA-5, a drainfield and three holding tanks (ER sites 4, 5 and 52). The LWDS was designed to receive liquid wastes from the now-decommissioned Sandia Engineering Reactor (SER) and other experimental and support facilities. The last discharge of radioactive wastewater took place in April 1970. Since 1971, one of the holding tanks and the easternmost surface impoundment have received non-radioactive wastewater from Building 6580. Ground water occurs at a depth of about 470 feet.

As part of SNL's ER Project, four monitor wells have been installed at and near TA-5. In addition, a pair of nested wells were completed at a site northeast of TA-5 by SNL's sitewide project. Water levels in the nested wells indicate that a relatively strong downward gradient exists at the site.

TCE was detected by SNL in an LWDS monitor well in November 1993. Subsequent sampling by SNL and NMED has confirmed the presence of TCE and has also identified cis-1,2-dichloroethene and nitrate/nitrite (as nitrogen). Further sampling and additional monitor well installations would be required to determine nature, rate, and extent of contaminants in the ground water at the LWDS. Geologic, hydrologic, well construction, and water quality data (June 1993 to June 1994) have been summarized in a 1995 NMED report (**26**). An RFI report on the LWDS has been submitted by SNL to NMED and EPA. SNL has found additional sites at TA-5 which may be responsible, at least in part, for the ground water contamination there. SNL is investigating these sites separately from the LWDS.

TA-2 lies near the northeastern boundary of KAFB, on the north bank of Tijeras Arroyo. SNL ER monitor wells and SNL sitewide monitor wells show that there is shallow perched ground water above the deep regional saturated zone at TA-2. The shallow perched ground water lies at a depth of 320 feet and flows to the southeast, whereas the deep regional ground water lies at a depth of 600 feet and flows to the northwest. The southeasterly flow direction of the perched ground water indicates that it is not influenced by pumping of City of Albuquerque wells tapping the deeper regional aquifer.

At the time of NMED's initial assessment of SNL's ground water monitoring program **(19)**, only one temporary monitor well had been installed at TA-2. Ground water sampling and analysis by SNL and NMED revealed elevated nitrate levels (26 mg/L). Analysis of samples from four existing sitewide monitor wells east and southwest of TA-2 and four monitor wells subsequently installed at TA-2 showed TCE concentrations as high as 8.1 ug/L and nitrate concentrations as high as 23 mg/L (EPA drinking water standards are 5 ug/L and 10 mg/L, respectively). TCE has been detected in the shallow perched ground water (three wells) and in deep regional ground water (five wells).

Three SNL ER sites, where monitor wells are lacking, are currently of concern to the DOE Oversight Bureau. These sites are the Schoolhouse site, the tank farm located near the southwest corner of TA-1, and the Tijeras Arroyo in the vicinity of TA-4 (especially at ER Site 46). Based on historical records of site activities and waste disposal

practices, potential contaminants include solvents and other organics (Tijeras Arroyo and Schoolhouse), heavy metals (Tijeras Arroyo), nitrate/nitrite (Schoolhouse) and diesel fuel (tank farm). The DOE Oversight Bureau has conveyed concerns about these sites to SNL, DOE and appropriate regulatory programs of NMED.

Ground Water Oversight and Monitoring Activities at the Lovelace Respiratory Research Institute

As a result of a contractual change with DOE, the facility formerly known as ITRI is now called the Lovelace Respiratory Research Institute (LRRI). LRRI is located at the southern boundary of KAFB, adjacent to the Pueblo of Isleta. Geologically, LRRI sits on the Hubbell bench, one of a series of structural surfaces that step downward from the Manzano Mountains to the Albuquerque Basin. The average elevation of the LRRI area is 5,650 feet above sea-level. Drainage is by ephemeral streams in arroyos.

Hydrogeologic Setting at LRRI

Geologic materials at the facility consist of thin alluvial sediments of the Santa Fe Group disconformity overlying Permian redbeds. The mountain-front benches, such as LRRI sits on, serve as recharge areas for the deeper and thicker "regional aquifer" of the central basin from which KAFB and COA draw their water. The relief on the pre-Cenozoic surface in these benches strongly influences ground water occurrence and movement there. Ground water in the vicinity of LRRI is found at a depth of approximately 100 feet in the Santa Fe Group. Across a major fault, roughly one mile west of LRRI, depth to ground water increases rapidly to approximately 500 feet.

Water Supply at LRRI

As is the case with SNL, LRRI does not operate its own water supply system, but utilizes that of KAFB, the host facility.

Ground Water Quality at LRRI

A contaminant plume emanating from the LRRI sewage treatment lagoons (shut down in 1994) has raised the concentrations of nitrate, total dissolved solids, chloride, and sulfates in ground water to levels exceeding New Mexico ground water and drinking water standards. Analytical results for recent NMED ground water samples from the Ground Water Quality Bureau's (GWQB) monitor wells (see *Environmental Restoration Activities* below) indicates that this plume is moving south onto the Pueblo of Isleta. Additionally, elevated gross alpha activity, BTEX components, and freon have been detected in various LRRI monitor wells.

Sitewide Hydrogeology Activities at LRRI

NMED's initial review of LRRI ground water monitoring network (**28**) revealed problems in ground water sampling protocol and the conceptual hydrogeologic model for the site. Although LRRI envisions ground water movement to be northwesterly, water level mapping by the DOE Oversight Bureau indicates a southerly component to ground water flow (from LRRI onto the Pueblo of Isleta). An analysis of bedrock and water level elevations from LRRI area monitor wells and boreholes indicates ground water flow is controlled by buried bedrock topography. More specifically, ground water is being directed from the LRRI lagoons to the north onto KAFB and to the south onto the Pueblo of Isleta by a paleochannel in the buried bedrock surface.

Surveillance Activities at LRRI

Because the LRRI lagoons are known to have contaminated the underlying saturated zone, ground water monitoring at LRRI has moved beyond surveillance into ER assessment.

Environmental Restoration Activities

LRRI's ground water monitoring program includes nineteen monitor wells and seven piezometers. Currently, under agreement with GWQB, LRRI samples eight monitor wells and three piezometers for general chemistry, volatile organic compounds (VOC's), synthetic organic compounds (SVOC's), nutrients, isotopic uranium, gross alpha and beta, and gamma speciation.

The DOE Oversight Bureau's involvement of ER activities at LRRI includes splitting samples of ground water, sewage-lagoon water and sewage-lagoon sludge with LRRI, as well as implementing a monitor well drilling and installation program. In the summer of 1994, to address concerns voiced by the Pueblo of Isleta and to test the conceptual hydrogeologic model, the DOE Oversight Bureau completed one monitor well and one dry borehole on the Pueblo of Isleta, southwest of LRRI (**28**). Based on the oversight program's conceptual hydrogeologic model, as well as ground water chemistry and subsurface data obtained from the monitor well/borehole installation, GWQB required DOE to install three additional monitor wells at LRRI, at locations recommended by DOE Oversight personnel. In the summer of 1995, Phase 2 of NMED's ground water investigation at LRRI was initiated with the drilling of two additional monitor wells and one dry borehole on the Pueblo of Isleta, southwest of LRRI, and installation of one monitor well on KAFB, northwest of LRRI (**29**). Preparation of a hydrogeologic report on the DOE Oversight Bureau's investigations at LRRI is underway.

Ground Water Oversight and Monitoring Activities at the Waste Isolation Pilot Plant

The Waste Isolation Pilot Plant is located approximately 26 miles east of Carlsbad in the far southeast corner of the State. The facility lies in the area called "Los Medanos", on a karst plain that rises eastward from the Pecos River to the Southern High Plains (**30**). The general ground slope is 50 feet per mile westward towards the Pecos River, located fourteen miles away at its closest point. The general ground elevation is 3,400 feet above mean sea level and is around 500 feet above the riverbed and over 400 feet above the flood plain. Owing to the blanket of permeable dune sand and the karst setting, integrated surface drainage features are largely nonexistent (**7**).

Hydrogeologic Setting at WIPP

Subsurface geologic formations and aquifers are covered by dune sand in the vicinity of WIPP. Storm water runoff is diverted away from the facility by a system of peripheral interceptor diversions. The Salado is the formation which contains the WIPP underground repository. This formation does not have any active circulation of water and is a major confining unit of low permeability. Fluids primarily occur as isolated pockets of brine and are not known to connect to any aquifers. The Rustler Formation, directly above the Salado, contains two aquifers known as the Magenta and Culebra and a residuum underlying the Rustler but considered as part of the Rustler Hydrologic unit. The Magenta and Culebra Members are dolomitic and contain water ranging from fresh to salty, whereas the basal Rustler residuum is always salty. Flow direction is southeast or basinward. The Dewey Lake Formation is located directly above the Rustler and is known to be the most predominate source of fresh water in the area. The aquifer in this zone is lense-like and is not present over the entire WIPP site. General flow direction is southwest.

Water Supply at WIPP

The water provided to the WIPP site is piped in from ground water wells in Carlsbad. Bottled water is provided and recommended for consumption purposes.

Sitewide Hydrogeology Activities

Much previous work by DOE has been done on the general conceptual hydrogeologic model at WIPP. Work continues on the details.

Waste Management Activities at WIPP

Although the repository is not yet receiving Transuranic (TRU) waste, some waste is generated through onsite operations (for example, waste rock from shaft construction and drilling mud). The DOE Oversight Bureau oversees and assesses such waste management activities.

Environmental Restoration Activities at WIPP

For information on ground water and surface water data, conclusions and recommendations from oversight and monitoring at New Mexico DOE Facilities see the NMED report titled *Initial Inspection of Site Water Systems and Wells at DOE Facilities in New Mexico*, (**31**) which satisfies X.A.B.3, Action No. 17 of the DOE/NMED Agreement in Principle.

Superfund

The 1980 federal Comprehensive Environmental Response, Compensation and Liability Act (Superfund), as modified by the Superfund Amendments and Reauthorization Act of 1986 (SARA), provides for cleanup of inactive hazardous waste sites ranked on the National Priorities List (NPL). Superfund also provides for emergency response by the EPA to clean up hazardous waste sites which pose an imminent hazard to public health or the environment. Superfund further directs EPA to determine liability for improper hazardous waste disposal and to recover costs from responsible parties for cleanup. Finally, Superfund provides a mechanism for states and others to file claims to gain compensation for damages to natural resources.

With the exception of the emergency incident provisions of the Hazardous Waste Act which has limited applicability, New Mexico has no State-funded program to address the problems of inactive or abandoned hazardous waste sites. EPA administers the federal Superfund program and is the lead agency for most Superfund activities in New Mexico. NMED maintains a Multi-Project Cooperative Agreement with EPA. This agreement provides 100 percent federal funds to allow the State the lead role in certain projects and to permit State involvement in projects where EPA is the lead agency.

The State takes the lead role in identifying and investigating potential new Superfund sites. Twenty to thirty sites are investigated each year. The most serious sites are scored using the Hazard Ranking System and are nominated for the NPL. Nationally, there are approximately 1,236 sites on this list.

Nine New Mexico sites are currently included on the NPL: Albuquerque South Valley Site; United Nuclear Corporation Uranium Mill Tailings in McKinley County; Homestake Mining Company Uranium Mill Tailings in Cibola County; Atchison, Topeka and Santa Fe Railroad sites in Clovis and Albuquerque; Prewitt Refinery in McKinley County; Cleveland Mill in Grant Count; Lee Acres Landfill in San Juan County and Cimarron Mining Company in Lincoln County. The North railroad Avenue Plume site in Española, Rio Arriba County, was proposed for inclusion on the NPL and listing is expected to be finalized in February, 1999. The old Rinchem Company site in Albuquerque, has been proposed for deletion from the NPL. EPA is the lead agency for the required Remedial Investigations and Feasibility Studies at

these sites with the exception of the North Railroad Avenue Plume site in Española which is a State-lead site. EPA funds NMED to participate in these projects by reviewing and commenting on workplans, proposals and reports. Federal law requires New Mexico to pay ten percent of final Superfund remedies when federal Superfund money is used for remedial actions.

Superfund has conducted several emergency removals in New Mexico. EPA investigates candidates for emergency removals and performs the cleanups, if deemed necessary. NMED works with EPA to determine when such action is necessary.

Section 104(c)(9) of Superfund, as amended, requires each state to assure adequate capacity to manage the hazardous wastes expected to be generated in the state over the next twenty years. After October 17, 1989 remedial actions using Superfund money could not be undertaken in a state unless that state has a 'Capacity Assurance Plan' (CAP). New Mexico's CAP was submitted to EPA in time to meet this deadline. Governors of the five states in EPA's Region VI (Arkansas, Louisiana, New Mexico, Oklahoma and Texas) mutually agreed that capacity within the region was adequate to meet foreseeable management needs through the year 2009. While adequate capacity exists within this region, the CAP is only a planning document and does not in any way restrict interstate commerce in hazardous waste.

In Situ Leaching Operations

In situ or *in solution* mining, which describes the movement of the desired metal from the parent rock into the injected fluid, involves injecting reactive solutions into the subsurface where they dissolve targeted ore-bearing strata. The impregnated liquids are then pumped back to the surface, where solutions are processed to remove the desired product out of solution. The only uranium *in situ* leaching project that has been operational in the State was Mobil's Section 9 Pilot Uranium Project near Crownpoint in McKinley County. Leaching for uranium production was ended and ground water reclamation started in 1980. Ground water reclamation satisfying the requirements of both the State ground water discharge permit and the NRC license was completed in 1988, and the license was terminated. Hydro Resources Incorporated (HRI), a subsidiary of Uranium Resources Incorporated, acquired the Crownpoint property and facilities from Mobil and conducted ground water tests prior to applying for a discharge permit from the State and beginning *in situ* uranium leaching operations. HRI applied to NMED for a discharge plan permit (DP-558) for *in situ* uranium mining at Church Rock in 1988. A public hearing was held and the permit was granted in November 1989. HRI applied for a modification of DP-558 in September of 1992. A public hearing was held in October of 1993. The modification was approved in October of 1994. HRI also applied for a discharge plan permit for *in situ* uranium mining at their Crownpoint location in June of 1992 (DP-870). That application has been delayed pending a resolution of ground water regulatory issues. In 1993, HRI applied to NRC for a license to *in situ* mine uranium at Church Rock, Crownpoint, and Unit I west of Crownpoint.

Wellhead Protection

The federal SDWA reauthorization and amendments, signed into law on June 19, 1986, included within § 1428 provisions for wellhead protection which require states to adopt programs incorporating six specified elements. As used in this Act, '*wellhead protection area*' is defined as the surface and subsurface area surrounding a water well or wellfield supplying a public water system, through which contaminants are reasonably likely to move toward and reach such well or well field.

The SDWA provided that states shall submit to EPA programs for wellhead protection incorporating all six aspects listed in the Act by June 19, 1989. New Mexico was one of twenty-six states to submit programs to EPA in time to meet the June 1989 deadline **(31)**. EPA has subsequently approved program studies and projects from NMED and some of the State's largest municipalities. These efforts are primarily focused on identifying real and potential sources of contamination within wellhead protection areas (WHPAs), and are detailed below.

NMED's Ground Water Section (GWS) of the GWQB recently submitted a Wellhead Protection (WHP) study for the City of Española to EPA, Region VI. The study was completed in January 1994 with funding through an EPA Underground Injection Control Program Grant. An original federal grant awarded in 1991 funded a Class V Shallow Injection Well Initiative which identified two Public Water Supply (PWS) wells contaminated with chlorinated hydrocarbons. The subsequent study expanded that previous work by delineating WHPAs for all wells in the Española PWS system. In addition to the 1,000-foot WHPA-mandated protection zones set by the State's Wellhead Protection Program, staff used a combination of the EPA's computer modeling program *WHPA 2.0* and *Design Cad 2.0* to identify and plot onto municipal maps time-related capture zones (5, 10, 20 and 30 years) through which contaminants could travel and pollute ground water resources. These maps indicate exact locations of surface and subsurface activities of concern within individual WHPAs. Furthermore, the recent study provides the citizens of Española with a realistic management plan for protecting their PWS wells through both regulatory and non-regulatory approaches. Non-regulatory management focuses on an aggressive public education plan and emphasizes the dual responsibilities of City officials and concerned citizens. Emphasis is placed on the economic benefits of prevention versus remediation.

The City of Las Cruces has recently developed a Wellhead Protection Project Plan. The plan includes four distinct

phases: Phase I - ground water modeling; Phase II - field assessments to identify potential contamination sources; Phase III - development of a protection plan using comprehensive management approaches; and Phase IV - development of a comprehensive contingency plan. The first three phases of the plan have been implemented. Phase I, funded with municipal funds, is a joint effort with the (NMSU) Civil Engineering Department. Phases II and III have been partially funded by EPA through a SWDA § 1442 (B)(3)(C) Wellhead Protection Demonstration Program Grant. The Project includes delineation and mapping of potential sources of contamination, ground water modeling to delineate zones of contribution and risk assessment, and incorporation of derived spatial and relational information into a Geographical Information System (GIS) environment.

Las Cruces has formed a committee, the "*Advisory Committee on Regional Groundwater Protection Strategies and Availability*", which meets bimonthly to share information and ideas on topical issues concerning the membership. Representatives include the City of Las Cruces, Anthony Water and Sanitation District, Elephant Butte Irrigation District, South Central and Rio Grande Council of Governments, Doña Ana County, State Highway and Transportation Department, State Engineer's Office, NMED, NMSU, New Mexico Water Resources Research Institute, City of El Paso, Texas Water Utilities, El Paso, Texas City-County Health and Environment District, the United States Geological Survey and the public. Wellhead protection, reducing duplicity in resource management and opening new avenues for dialog are common goals for all committee members.

Each year, EPA region VI presents Environmental Excellence awards to the top Wellhead Protection Programs from each of the states in the Region. Public water systems in New Mexico that have received these Environmental Excellence Awards in 1995 and 1996 are Blue Water Lake and Rincon, respectively. Additional public water systems that competed for these awards include Rehoboth and Glorieta Estates.

OTHER FEDERAL PROGRAMS

Please see the Office of Technology Assessment's Protecting the Nation's Ground Water from Contamination **(32)** and the Environmental Protection Agency's Protecting the Nation's Ground Water: EPA's Strategy for the 1990s **(33)** for summaries of federal programs, including some of the programs described above.

COUNTY AND MUNICIPAL AUTHORITIES

The New Mexico State Legislature has given extensive authority to counties and municipalities in the areas of regulation of land use and of protection of public health and safety, areas with substantial implications for ground water quality protection. The principal statutes in these areas are summarized in Appendix E, while the most important aspects for water quality are described below. The statutes grant to local governments broad authority to adopt regulations or take other measures pertaining to protection of health, suppression of disease, sewage facilities, water facilities, refuse collection and disposal, etc. In reviewing these statutes, one should be aware of the provision in § 4-37-1, NMSA 1978 which states: "All counties are granted the same powers that are granted municipalities except for those powers that are inconsistent with statutory or constitutional limitations placed on counties."

Although counties and municipalities have extensive legislative authority to institute measures to protect ground water quality, most have not taken full advantage of this authority. One reason is that most counties and municipalities have limited resources. Another factor that deters some local governments from instituting aggressive ground water protection programs is a division of opinion among citizens about land use regulations which limit what they can do with their property, and whether such programs are desirable.

Subdivision Regulations

The New Mexico Subdivision Act, first adopted in 1973, was extensively amended in 1995. The new amendments change the definition of "subdivision" to include almost all divisions of land. They require counties to adopt regulations regarding items of critical concern such as water availability and quality, utility easements, roads, protection of cultural sites, and liquid and solid waste disposal. Under the new amendments the subdivider must meet the needs of the subdivision with respect to these items; previously, the subdivider only had to satisfy whatever proposals he made in his disclosure statement. the Counties of Bernalillo, Doña Ana and Santa Fe had until July 1, 1996 to adopt regulations meeting the new criteria, whereas all other counties have until July 1, 1997 to do so.

Planning and Zoning

Counties and municipalities have authority for planning and platting and, under the Zoning Enabling Act (§§ 3-21-1 et seq., NMSA 1978), authority to establish zoning restrictions designed, among other things, to promote health and general welfare and to facilitate adequate provision for water and sewerage. Newly discovered ground water contamination problems, resulting

from old underground storage tanks, industrial wastes, septic systems, and evapotranspiration system leakage, have aroused the interest of public officials in new planning and land-use approaches based on very real, current needs, and may well provide the impetus for a new generation of realistic land-use regulation.

Conditions Applied to State Requirements

A condition affecting what the State can require of local governments was added to the Constitution of the State of New Mexico in 1984:

"*A State rule or regulation mandating any county or city to engage in any new activity, to provide any new service or to increase any current level of activity or to provide any service beyond that required by existing law, shall not have the force of law, unless, or until, the State provides sufficient new funding or a means of new funding to the county or city to pay the cost of performing the mandated activity or service for the period of time during which the activity or service is required to be performed.*"

PUBLIC INVOLVEMENT

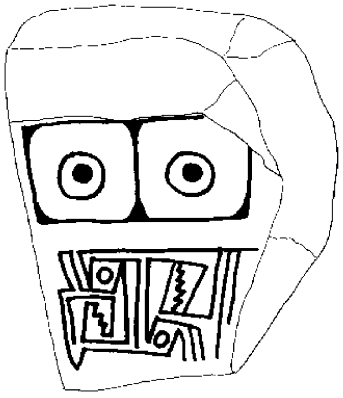
In New Mexico public involvement is an important aspect of programs to protect ground water quality. Public participation includes public notices, opportunities for public hearing, and the formation of advisory groups for regulation development and revision and there commendation of public policy. Public recognition is given to businesses and organizations which have shown excellence in their efforts to protect the State's ground water. An example is given below.

Water Fair Program

At one or two-day water fairs, NMED, cooperating agency staff, and local volunteers set up a mobile laboratory and conduct free field testing of drinking water samples collected by private citizens from their individual water supplies. Public concern about contaminated private wells led NMED to develop a program to conduct free tests for nitrate, pH, mineral content, and volatile organic chemicals. Tests for iron, manganese, sulfate, fluoride and sulfide can be done if warranted. Well numbers are assigned to each source and the sample results entered into the water fair database. Although the information is suitable only for screening purposes, follow-up samples are collected for laboratory analysis when health threatening pollutants are detected at levels of concern.

When contamination of the well is noted by the water fair testing, follow-up samples are collected for laboratory analysis. The water supply users are advised of proper steps to take to protect themselves, and a referral is made to the proper ground water program so that the source of contamination can be found. In many cases, either the State or the party responsible for the contamination has provided a new water supply.

In addition to water quality test results, visitors to a water fair are provided with health and pollution prevention information. Published in English and Spanish, packets include fact sheets about water-borne diseases, health risks from drinking contaminated water, household toxics and pesticides, and an illustrated brochure about New Mexico's ground water resources **(34)** which suggests ways to prevent contamination. Water fairs bring water scientists to small communities where they are available to discuss ways to protect ground water and proper waste disposal while answering questions about our ground water resource. The basic ground water information generated becomes available to the public and all NMED programs.



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